	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition	Errors
1	BRS	L8	19	(CMP or "chemical mechanical polishing") same (two near4 ((light near4 source) or (wavelength)))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 13:04			0
2	BRS	L15	2442	(CMP or "chemical mechanical polishing") same (manufactur$3 with semiconductor)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 13:05			0
3	BRS	L22	121	15 and (endpoint with detect$3)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 13:06			0
4	BRS	L29	63	22 and 438/$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 14:51			0
5	BRS	L36	17	29 and @pd<=20000308	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 14:50			0
6	BRS	L43	212	5,036,015	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 14:48			0
7	BRS	L50	151	stop$5 with endpoint with (cmp or "chemical mechanical polishing")	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 14:50			0
8	BRS	L57	30	50 and @pd<=20000308	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 17:54			0

	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition	Errors
9	BRS	L64	11	57 and 438/$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 17:55			0
10	BRS	L71	0	64 not 57	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 15:22			0
11	BRS	L78	19	57 not 64	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 17:30			0
12	BRS	L85	7	(polish$3 adj rate) with (intensit$3 near5 (reflect$3 adj light))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 17:37			0
13	BRS	L106	1	"6508952"	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 18:27			0
14	BRS	L92	10	(polish$3 adj rate) same (intensit$3 near5 (reflect$3 adj light))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 17:51			0
15	BRS	L113	194	(remov$3 or detach$3) with wafer with stop$4 with (polish$3 or cmp or "chemical mechanical polishing")	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 18:03			0
16	BRS	L120	71	113 and @pd<=20000308	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 18:08			0

	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definition	Errors
17	BRS	L127	39	120 and 438/$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 18:09			0
18	BRS	L134	410	((remov$3 or detach$3) adj3 wafer) same (after near4 (polish$3 or cmp or "chemical mechanical polishing"))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 18:05			0
19	BRS	L141	167	134 and @pd<=20000308	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 18:09			0
20	BRS	L148	52	141 and 438/$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/01/07 18:10			0

US-PAT-NO: 5597443

DOCUMENT-IDENTIFIER: US 5597443 A

TITLE: Method and system for chemical mechanical polishing of semiconductor wafer

---------- KWIC ---------

Another aspect of the invention provides a CMP system and related method for using the system to polish a semiconductor wafer. The CMP system permits carrying out the steps of **removing the semiconductor wafer** from a load cassette
and placing the semiconductor wafer on a carrier device. A primary platen receives the semiconductor wafer and carrier device. The CMP system coats a pad on the primary platen with a slurry that includes a mixture of lubricating agents and delicately abrasive materials while the semiconductor wafer is on the primary platen. The CMP system then polishes the semiconductor wafer by rotating the polishing pad and carrier that holds the semiconductor wafer in opposite directions and placing the rotating semiconductor wafer in contact with the rotating pad which contains the lubricating and abrading slurry. **After polishing** the wafer, the CMP system moves the semiconductor wafer and carrier device to a cleansing station for **removing the slurry from the semiconductor wafer**. **Removing the slurry from the semiconductor wafer** occurs
next using a pressurized aqueous solution that includes a pH controlling mixture for controlling the pH of the slurry coating. The aqueous solution has sufficient force to spray away from the semiconductor device the slurry coating, while the pH controlling mixture neutralizes the pH of the slurry to facilitate its removal. The CMP system then **removes the semiconductor wafer**
and places the semiconductor wafer in an unload cassette without further handling or buffing of the semiconductor wafer.

After the CMP process on semiconductor wafer 14, arm 20 transfers wafer carrier
16 and semiconductor wafer 14 to cleansing station 28. At cleansing station 28 spray mechanism 32 sprays a jet of water past NH.sub.4 OH dispensing tube 36 for mixing water with a NH.sub.4 OH mixture. This step removes **the slurry**

from
semiconductor wafer 14. Following the NH.sub.4 OH/water jet rinse, robotic arm
20 transfers carrier device 16 and semiconductor wafer 14 to a unload wafer track 15 that goes to unload cassette 38. Cassette elevator 17 submerses unload cassette 38 to make it available for further processing.

With reference to FIGS. 1 through 3, above, upon placing a load cassette 12 in wafer polishing system 10, wafer polishing system 10 transfers semiconductor wafer 14 to wafer carrier 16. Wafer carrier 16 holds semiconductor wafer 14 in place by vacuum force applied to the back side of semiconductor wafer 14. Robotic arm 20 lifts and places carrier 16 so that semiconductor wafer 14 contacts pad 19 on primary platen 18. Slurry applicator 22 applies a slurry 23 to pad 19. Then, the semiconductor wafer 14 is then polished as described above. After the CMP step is complete robotic mechanism 20 sends semiconductor
wafer 14 to cleaning station 28 where pressure water spray 30 and pH controlling compound spray 34 removes as many particles as possible from semiconductor wafer 14. Then, robotic mechanism 20 removes semiconductor wafer
14 from cleaning station 28 and places semiconductor wafer directly into load cassette 38. This completes the chemical mechanical polishing process that present embodiment provides.

US-PAT-NO: 5643405

DOCUMENT-IDENTIFIER: US 5643405 A

TITLE: Method for polishing a semiconductor substrate

--------- KWIC ---------

An additional problem associated with using double sided polishers is that when top plate 22 is removed **after polishing** has finished, the wafers tend to adhere to upper polishing pad 23. When this happens, manufacturing personnel must manually **remove the wafers** from the upper polishing pad. This detrimentally impacts process automation, throughput, and quality. To support process automation, the wafers must remain on lower polishing pad 13 so that automatic wafer handling means can **remove the wafers** and place them, for example, into a
wafer carrier.

US-PAT-NO: 5770521

DOCUMENT-IDENTIFIER: US 5770521 A

TITLE: Anti-shear method and system for semiconductor wafer removal

---------- KWIC ---------

FIG. 3B is a simplified, diagrammatic side view of the polishing apparatus illustrated in FIG. 1 disposed in an opened position, **after removal of the semiconductor wafer from the polishing pad after completion of the polishing**
cycle.

Referring now to FIGS. 3A, and 3B, arm 26 is also operative for moving carrier 22 between one position in which the carrier is moved towards the platen 18 wherein the wafer 24 engages pad 20 (FIG. 3A), and another position wherein carrier 24 is moved away from platen 18 **after removal of the wafer 24 from polishing** pad 20 (FIG. 3B). When in the engaged position (FIG. 3A), the axis of rotation of carrier 22 is substantially parallel to the axis of rotation of platen 18. As diagrammatically illustrated in FIG. 3B, pivot 29 permits the movement illustrated in FIGS. 3A, and 3B. It should be understood, however, that this structure is merely diagrammatic, and is in no way intended to limit the present invention to such structure. It should be further appreciated that there are a wide variety of equivalents well-known to those of ordinary skill in the art to perform the function of causing carrier 22 to move towards platen 18 so that wafer 24 engages pad 20, and, subsequently, **after a polishing** operation, to **remove or lift wafer** 24 from the pad. Such movement is accomplished by use of conventional drive and movement means well-known to those of ordinary skill in the art under the control of controller 14 according to the predetermined strategy stored in memory 16.

An apparatus and method for **removing a semiconductor wafer** from a polishing
pad, according to the invention, significantly dissipates the attracting forces between the polishing pad 20, and the wafer 24, that arise during Chemical Mechanical Polishing thereby allowing the wafer 24 to be easily removed from the platen **after the polishing** operation. Significantly, the above-described "anti-shear" method and system permits 8-inch wafers to be easily removed from

the polishing pad; conventional methods result in dropped wafers, and/or extreme arm forces, which are undesirable. The invention saves countless hours
of machine/process downtime by alleviating the dropped wafer problem. Moreover, in contrast to conventional methods, wherein many of the dropped wafers were usually damaged to the point of having to be scrapped, the present invention substantially reduces or eliminates dropped wafers altogether.